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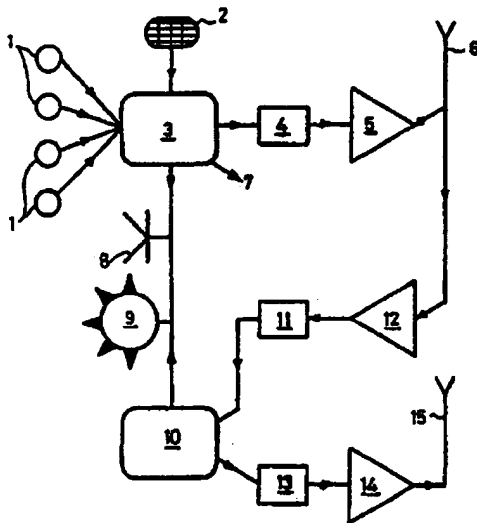
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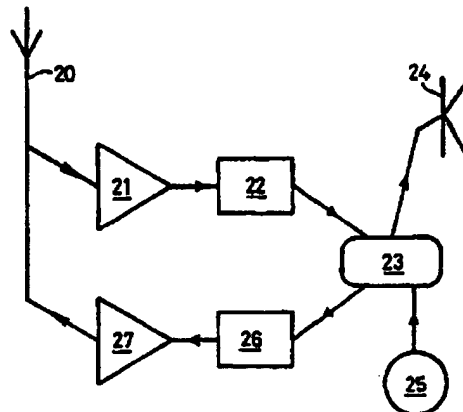
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**(54) Vehicle security systems**

(57) A system in which the vehicle carries a device (figure 1) for paging the vehicle owner if the vehicle is unlawfully interfered with and the owner is equipped with a portable response device (figure 2) for responding to the vehicle device. The response device transmits a pager message to the vehicle device upon receipt of a warning from the vehicle device and after owner acknowledgement (by activating a switch on the response device). The vehicle device activates a radio tracker upon detection of this signal and may also activate an audible or visual alarm or an immobiliser. Coded signals may be used between the two devices.



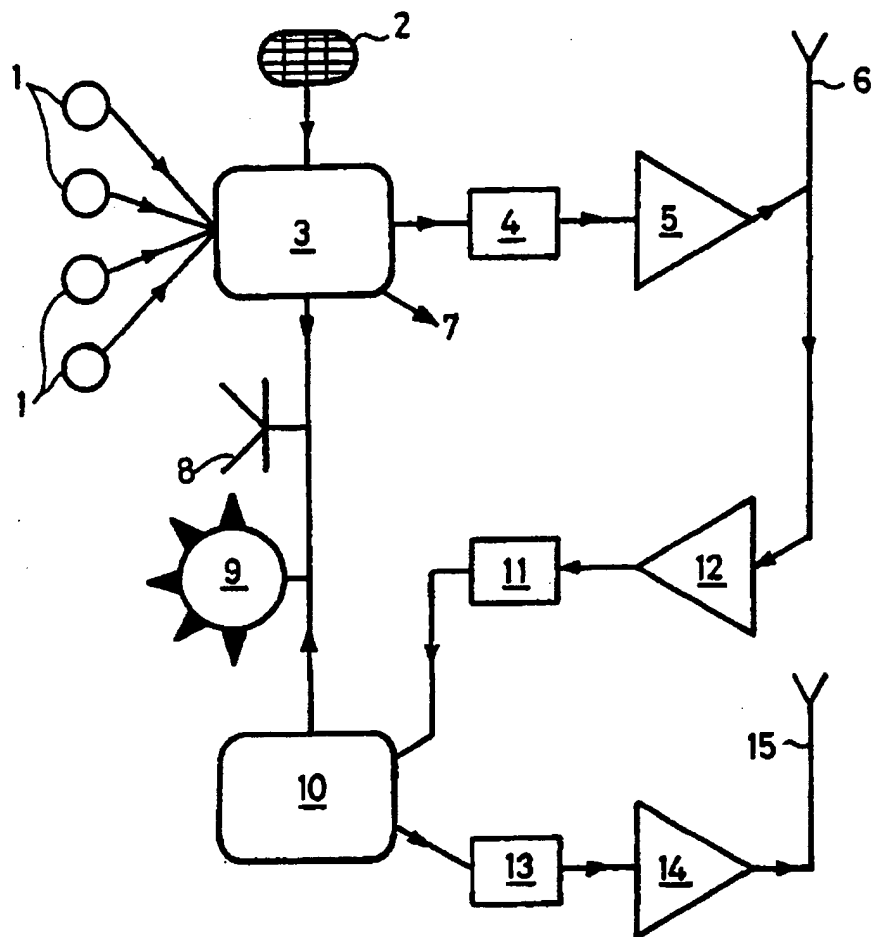
**Fig. 1**



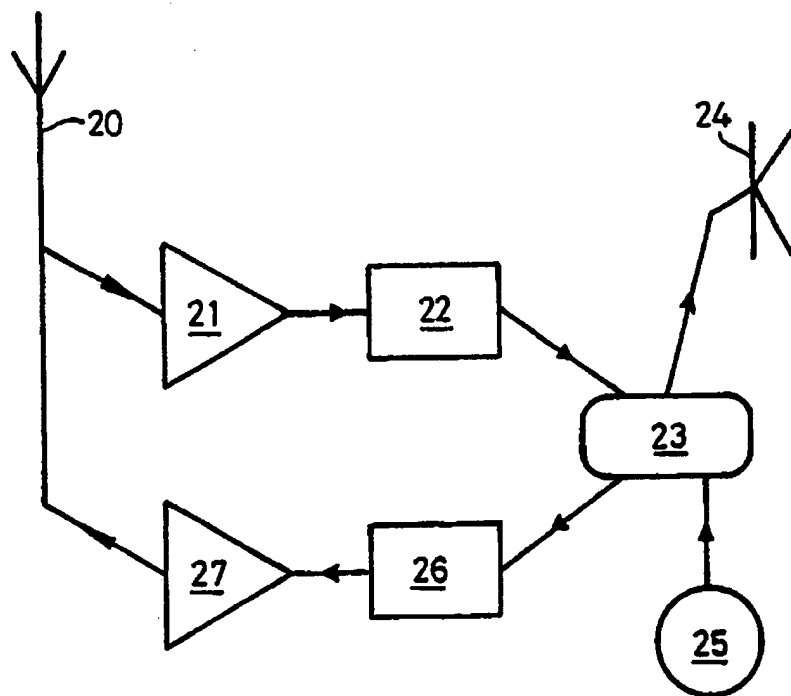
**Fig. 2**

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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**Fig. 1**



**Fig. 2**

Improvements in Vehicle Security Systems

This invention relates to a vehicle security system.

Various security systems for vehicles are well known. Generally, an audible alarm is triggered, when the alarm  
5 is set, for example in response to physical disturbance of the vehicle, the opening of a door, and/or change in the air pressure within the vehicle. However, once a professional thief has immobilised the alarm, by-passed the ignition and driven the vehicle away, the chances of  
10 recovery of the vehicle are relatively slim.

In an endeavour to overcome this problem, it is known to provide the vehicle with a radio tracker, which transmits a VHF radio signal capable of being picked up by police  
15 cars having a suitable tracking receiver. The radio transmission enables the stolen vehicle to be tracked and often eventually recovered. This known system is effective but expensive, and involves the services of a tracking company capable of activating the radio tracker  
20 when informed by the vehicle owner (or driver) that the vehicle has been stolen. Thus, in many instances, a long delay will occur, after the theft has actually taken place, before the radio tracker is activated.

25 According to the invention, there is provided a vehicle alarm system comprising, for mounting in the vehicle, a device including a transceiver including a signal-transmitting paging device and means for activating the paging device in the event of unauthorised entry to  
30 or use of the vehicle, and a portable device including a

- receiver adapted to be carried by the owner and responsive to a paging signal to produce an alarm signal which alerts the vehicle owner or driver to a possible theft of the vehicle, the owner device including a
- 5 response-signal transmitter, and the vehicle device including response-signal receiver and means able to activate a radio tracker on board the vehicle when a response signal is received.
- 10 The term "vehicle", as used herein, is intended to be broadly interpreted to cover motor cars, lorries, trailers such as goods-carrying trailers and caravans, and also sea-going vehicles such as motor cruisers and yachts.
- 15 The term "owner", as used herein, means the owner or other person in charge of the vehicle at the time.

As both the vehicle device and the owner device incorporate both a transmitter and a receiver, these may be in the form

20 of transceivers.

The invention enables a radio tracker in the vehicle to be activated by a signal sent out by the owner alerted by the paging signal. At the same time, the owner can

25 inform the police of the theft and give all relevant particulars, possibly including information relating to the signal being transmitted from the stolen vehicle. Alternatively, the owner may advise a tracking company of the theft, in accordance with the known tracking system.

30 The vehicle may also incorporate a hidden immobilisation switch operable by the response signal sent out by an alerted vehicle owner. This immobilisation switch may be connected in the vehicle ignition circuit, but could

alternatively be located, for example, in the fuel feed.

The vehicle paging device may also be associated with an alarm circuit of the kind which also provides an audible  
5 alarm of any one of the various known available kinds.

The invention has the advantage that the vehicle owner is able to take action responsive to the vehicle theft immediately, instead of no action being taken until the  
10 owner uncovers the theft.

However, in all cases, it is possible for the owner to check that the received paging signal is not a false alarm and that the vehicle has in fact been stolen before notifying  
15 the police of the fact.

One possible application of the invention is in the trailer unit of an articulated vehicle having a security system of the kind described in U.K. Patent Application No. 9319476.9.  
20 This security system includes alarm circuitry incorporating an alarm which is activated if an attempt is made to raise the trailer ground support in an unauthorised manner when the tractor unit is disconnected. In such a security system, the alarm circuitry may be associated with a  
25 paging device in accordance with the present invention, and the vehicle owner equipped with a transceiver in accordance with the invention.

The vehicle owner's portable receiver or transceiver can  
30 be very small, for example being incorporated in a tag carried by a key ring to which the owner can also attach the vehicle key or keys. The device is required essentially to incorporate, in addition to simple transceiver circuitry and a small battery, an audible or

visible alarm and a small switch operable to cause a radio response signal to be transmitted to the vehicle.

It is obviously desirable, when a paging signal is  
5 transmitted at a given frequency  $F_0$  available for  
localised radio transmission, for the owner of the  
particular vehicle which has been interfered with to be  
alerted and not other owners in the neighbourhood,  
typically within a radial distance of at most a few miles  
10 from the vehicle, also to be alerted. Most preferably,  
therefore, the paging signal is transmitted at frequency  
 $F_0$  through an encoding device which in effect adds an  
owner-unique code to the signal and, at the owner device,  
the received signal is decoded and its code verified  
15 before the alarm device is activated. The alarm device  
is only activated if the code unique to that vehicle and  
owner is detected.

Correspondingly, the radio response signal sent on  
20 command from the vehicle owner to the vehicle is  
analogously coded, and the response signal decoded on  
board the vehicle to verify the code before a vehicle  
tracker and/or visual or audio alarm device and/or vehicle  
immobilisation device is or are operated. Most preferably,  
25 the paging signal code and the response signal code are  
different.

A third code is preferably employed when the vehicle  
tracker is operated to transmit a radio signal, at a  
30 different frequency preferably of much longer range, to  
pinpoint the vehicle to the police and/or security  
personnel. The third code may be such that it can be  
utilised by the police and/or security personnel to  
identify details of the vehicle and owner including, for

example, the make, colour and registration number of the vehicle.

In one example of practice of the invention, a security  
5 system in a car, in addition to an audible alarm device  
and a light flasher, incorporates a radio pager which is  
simultaneously operated. The pager transmits a unique  
signal which is received by a transceiver incorporated in  
the owner's key ring. A small audible alarm in the key  
10 ring transceiver alerts the owner of a possible car theft.

Optionally after checking that a vehicle theft has in fact  
taken place, the owner depresses a small switch on the  
transceiver, which causes a signal to be transmitted back  
15 to a radio tracking device hidden in the vehicle. The  
owner then telephones the police or security personnel to  
inform them of the theft and advises them of the particulars  
necessary to enable them to track the stolen vehicle.

20 The invention is further described with reference to the  
accompanying drawings, in which:-

Figure 1 is a functional circuit diagram of pager and  
tracker circuitry on board the vehicle; and  
25

Figure 2 is a functional circuit diagram of the vehicle  
owner's transceiver.

It is to be noted that Figures 1 and 2 are functional  
30 diagrams given for explanatory purposes; in both cases,  
many components may be combined within a printed circuit  
or microchip for economy both in space and cost.

Referring first to Figure 1, the illustrated circuit



comprises and operates as follows:-

A control panel 2 is used to arm and disarm a control circuit 3 as well as enable the entry of security codes (pin number) and other commands by the user (vehicle owner). A set of sensors 1 detect any abnormal condition and at the vehicle signal the control circuit 3, which, if already "armed" via the control panel 2, activates encoder 4 to send a unique identity code "a" to radio transmitter 5. The radio transmitter 5 sends an "a" coded radio signal at frequency "A" to aerial 6 which then broadcasts this alarm signal "Aa" to the user. This alarm transmission is repeated at regular intervals until answered by the user's transceiver (Figure 2) or cancelled from the control panel 2. In between transmissions receiver 14 is listening for any reply; the shared aerial 6 is switched between the transmitter 5 and the receiver 12 as appropriate.

Referring now to Figure 2, namely the user's transceiver:-

The aerial 20 receives the signal "Aa", which is passed to radio receiver 21 and decoded by decoder 22 for comparison with the built-in code "a". If the codes match this information is passed to control circuit 23 which activates buzzer/light 24. The user now determines what action to take and, if this is to raise the main alarm, the user presses button 25, which causes the control circuit 23 to activate encoder 26 to send a unique identity code "b" to radio transmitter 27. The radio transmitter 27 sends the "b" coded radio signal at frequency "A" to aerial 20, which then broadcasts this command signal "Ab" to the vehicle. This command transmission is repeated a set number of times for one

press of the button 25.

Referring back to Figure 1, namely the vehicle circuit:-

- 5 The aerial 6 receives the signal "Ab" which is passed to the radio receiver 12, and decoded by decoder 11 for comparison with the built-in code "b". If the codes match this information is passed to control circuit 10 which activates the encoder 13 to send a unique identity
- 10 code "c" to radio transmitter 14. The radio transmitter 14 sends a coded radio signal at frequency "B" to aerial 15 which then broadcasts this alarm signal "Bc" to receivers used by the police or security personnel.
- The local audio sounder 8, visual indicators 9 and control
- 15 output 7 can be activated by either of the control circuits 3 or 10 according to preset criteria and the input from the control panel 2. The control output 7 may be used to operate security mechanisms such as locks, extinguishers or engine cutouts, etc.

Claims

1. A vehicle alarm system comprising, for mounting in the vehicle, a device including a transceiver including a signal-transmitting paging device and means for activating the paging device in the event of  
5 unauthorised entry to or use of the vehicle, and a portable device including a receiver adapted to be carried by the owner and responsive to a paging signal to produce an alarm signal which alerts the vehicle owner or driver to a possible theft of the vehicle, the owner  
10 device including a response-signal transmitter, and the vehicle device including response-signal receiver and means able to activate a radio tracker on board the vehicle when a response signal is received.
- 15 2. A system according to claim 1, wherein the vehicle incorporates a hidden immobilisation switch operable by the response signal sent out by an alerted vehicle owner.
3. A system according to claim 1 or claim 2, wherein  
20 the paging device is associated with an alarm circuit of the kind which also provides an audible alarm of any one of the various known available kinds.
4. A system according to any of claims 1 to 3, wherein  
25 the owner device comprises a transceiver, a battery, an audible/visible alarm and a switch operable to initiate transmission of a radio response signal.
5. A system according to any of claims 1 to 4, wherein  
30 the paging signal incorporates a unique code accepted only by a decoder in the owner device appertaining to the owner of the vehicle from which the paging signal is transmitted.

6. A system according to claim 5, wherein the response signal incorporates a unique code accepted only by a decoder in the vehicle device appertaining to the vehicle of the owner from which the response signal is transmitted.

5

7. A system according to claim 6, in which the paging and response signals are transmitted at the same frequency but with differing codes incorporated.

10 8. A system according to any of claims 5 to 7, wherein the tracker signal, when transmitted, incorporates a code unique to the vehicle from which the tracker signal is transmitted.

15 9. A system according to claim 8, wherein the tracker signal is transmitted at a frequency different from that of the paging and response signals and with a unique code different from the codes of the paging and tracker signals.

20

10. A system according to any of claims 1 to 9, applied to an articulated vehicle trailer having a security system activated if an attempt is made to raise the trailer ground support when the tractor unit is  
25 disconnected, wherein the said security system is equipped with paging and tracker devices and the vehicle driver is equipped with a response device.

11. A vehicle security system substantially as herein-  
30 before described with reference to the accompanying drawings.

10

**Patents Act 1977**  
**Examiner's report to the Comptroller under Section 17**  
**(the Search report)**

Application number  
GB 9500217.6

**Relevant Technical Fields**

(i) UK Cl (Ed.N) G4N (NHVX), H4D (DAA, DBR, DPAA, DPAB, DPAC, DPAX)

(ii) Int Cl (Ed.6) B60R 25/10

Search Examiner  
P S DERRY

Date of completion of Search  
28 MARCH 1995

**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE - WPI

Documents considered relevant following a search in respect of Claims :-  
1-10

**Categories of documents**

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|--|---|
| <p><b>X:</b> Document indicating lack of novelty or of inventive step.</p> <p><b>Y:</b> Document indicating lack of inventive step if combined with one or more other documents of the same category.</p> <p><b>A:</b> Document indicating technological background and/or state of the art.</p> | <p><b>P:</b> Document published on or after the declared priority date but before the filing date of the present application.</p> <p><b>E:</b> Patent document published on or after, but with priority date earlier than, the filing date of the present application.</p> <p><b>&amp;:</b> Member of the same patent family; corresponding document.</p> |
|--|---|

| Category | Identity of document and relevant passages | Relevant to claim(s) |
|----------|--|----------------------|
| X        | EP 0588699 A1 (GILBERT)                    | 1 at least           |
| X        | US 3703714 (ANDREWS)                       | 1 at least           |

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